THE IMPACT OF QUALITY MANAGEMENT SYSTEM OF CONTACTOR QUALITY PERFORMANCE AT A LOCAL POWER STATION IN SOUTH AFRICA

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ABSTRACT

The purpose of this study is to evaluate the impact of Company X QMS on the contractors' quality performance. The study will also determine how Company X's QMS can be utilized to improve the quality performance of its contractors. The survey conducted evidently shows that one element was utilized to enforce contractors to comply with the quality requirements, and that is the implementation of Quality Control Plan (QCP) that is approved by Company X's Quality Department before execution of any project. Findings indicate that Company X needs to integrate quality requirements in the procurement process to ensure that contractors understand the quality expectations and requirements in its contractor management process.

Keywords: Quality Management System, Contractors performance, Quality Performance, ISO 9001.

INTRODUCTION

Company X – MPS Background and Challenges

X-MPS is a coal-fired power station based in Mpumalanga, South Africa, with approximately 718 employees (excluding students and contractors). The power plant is base-land, it works constantly, aside from amid consistent booked stoppages for reviews and upkeep on singular units. X-MPS comprises of six 600 MV units at an introduced limit of 3600 MV, the first of the monster 3600 MV coal-let go control station to be appointed in the1980's. Its normal accessibility during the most recent 3 years has been at 93,84%. MPS was at first intended for a working life expectancy of 30 years, be that as it may, it has been reached out to 60 years (Eskom, 2017).

MPS has contracted various companies to execute and render complex services including amongst other maintenance and refurbishment of boilers, turbine, precipitators, ash and dust plant and generators. The services rendered by contractors to MPS are crucial to an extent that the power station experiences several challenges shouldn't those services be effectively conducted. These challenges would include late completion of work, poor quality of the services, re-work, plants trips and contactors charging for work not executed. It is important to note that contactors fail to acknowledge the significance of quality management process; hence they experience inadequate work practices, schedule delays, budget over-runs and not adhering to scope requirements.

MPS is recognized as being ISO 9001 (Quality Management System) certified. However, only few contactors are also ISO 9001 certified. ISO 9001 ensured organizations should have a compelling quality framework and accomplish greatest consumer loyalty, benefit, worker inspiration, enhancements and least improves, protests and issues (Kumar and Balakrishnan, 2011). The reception of ISO 9001 was a key choice for Company X to enhance general execution and give a sound premise to maintainable advancement activities.

Purpose and Values of the Study

The aim of this study is to improve the quality performance of X-MPS by providing guidance regarding effective management of contractor's quality performance. Factors implicating poor quality performance of contractors will be analyzed to ensure they are effectively corrected. The study provides an insight on how the already implemented QMS by Company X can be enforced to the contractors to ensure quality services is rendered.

This paper intends to bring forth the benefits of QMS by determining the effect of QMS implementation on contractors' quality performance, examining the challenges of QMS implementation during the execution of the projects. The study will further present QMS benefits at MPS by determining the impact of X-MPS' QMS on quality performance of the contractors, and whether the implementation will improve the quality of the Contractors.

Scope, Limitations, Assumptions and Significance of the Study

The study was conducted at X-MPS and the population of the study comprised of contractors executing projects at MPS. There are several factors that influenced the challenges faced by the station. However, the study only focused on the quality factors resulting in poor performance of contactors.

The assumptions of the study are (1) Company X contractors are rendering poor-quality service, (2) Company X's QMS has no impact on contractors and (3) Contractors do not comply with Company X's QMS.
X-MPS utilizes the services of various companies to execute various projects on a contractual basis. These companies execute critical activities related to electricity generation of which if they fail to perform, Company X production will be affected, together with the country's ability to compete globally. Company X has appointed Contract Managers to manage the contractors to ensure that they perform as per their contractual obligations. However, Company X still faces a challenge of contactors not performing as per requirements or render poor quality services.

LITERATURE REVIEW

Quality Management System (QMS)

Viable QMS are dynamic and ready to adjust and change to address the issues, prerequisites, and desires of an organization's clients (Jones, 2014). A definition of QMS by Salimova and Makolov (2016) states that it is a model of the hierarchical conduct aimed at enhancing the quality keeping in mind the end goal of meeting the requests of concerned parties (stakeholders). Clause 8.4 of ISO 9001 standard (ISO, 2015) requires the organization to ensure that externally provided processes, products, and services are controlled and influenced by the organization. X-MPS has implemented the ISO 9001 certified system, and as such the company is required to ensure that its contractors adhere to the requirements of the standards. Before the enforcement of the QMS, Company X needs to conduct awareness training with all the contractors to ensure that they understand the requirements of the standard and expectations to implement the QMS.

The utilization of a QMS in dealing with a procedure to accomplish most extreme consumer loyalty at the least general cost to the association while proceeding to enhance the procedure (Hellman & Liu, 2013); customer satisfaction is at the heart of QMS hence it is important for companies to implement effective QMS. The contractors need to ensure that QMS is incorporated to their processes to ensure that they understand what their tasks are and who their customers are, be aware of the inputs into their processes in order to satisfy customers' requirements, analyse how they presently do their work and propose improvement opportunities because no one knows his/her work better than himself/herself do. Quality has been integrated to every function of the company and there are no reasons to keep the quality in separate department (Hellman & Liu, 2013).

Implementation of Quality Management System

The overall performance of the organization will be considerably improved through the implementation of QMS (Jaafreh and Al-abedallat, 2012). It is apparent that associations that have received a quality management system to center around accomplishing and maintaining a predominant level of value yields using administrative practices as sources of info and quality execution as yields (Jaafreh and Al-abedallat, 2012). QMS need to be applied as a tool to improve quality performance of organizations as well as their contractors. However, it does not necessarily mean that all contractors will be required to implement a certified QMS as they just need to have a complaint system which will be monitored by the client. Implementing QMS is proposed to assist with making the capacity to deliver items and administrations that meet as well as surpass consumer loyalty and material statutory/administrative prerequisites. QMS also assist with identifying and addressing risks associated with your business. QMS further assist with formulating the capacity to exhibit adjustment to determined necessities. QMS also assist with working with aligned process that are understood by everyone, therefore improving productivity and efficiency, bringing internal costs down. Lastly, QMS also assist with characterizing who is influenced by your work and their desires, as it will empower you to unmistakably express your targets and recognize new business openings.

According to Al-Ettayyem and Al-Zu'bi (2015), it is imperative to note that in order to have an effective QMS, the following eight dimensions of Total Quality Management (TQM) should be in place Leadership Employee administration, Customer center, Factual way to deal with basic leadership, Supplier administration, Continual change, System way to deal with administration and Process Management. A couple of studies have investigated the impact of applying quality organization measures on general definitive feasibility and execution; a significant number of these examinations have demonstrated strong and positive relations with quality execution (El-Tohamy & Al Raoush, 2015). The enforcement of quality management system will also address production performance issues in terms of projects execution and completion.

Supply Chain and Supplier Quality Management

Supply chain deals with suppliers who are suppling spares and consumables to Company X and they need to ensure that they supply the correct spares or consumables. It is critical to add that an alternative approach to quality enhancement within the supply chain, is partner's participation. As explored and noted by Zhu et al. (2007), the different roles that various parties play in a supply chain's quality improvement is clearly denoted with purchaser's participation which has a significant impact on profits for both supplier and purchaser. Therefore, the buyer benefits greatly by involving all the members within its supply chain in QMS. Kashmanian (2017) indicates that being aware of which providers are in a company's supply chain can guarantee product and service quality, as well as integrity, improve the company's bottom line, assist in substantiating claims, and eventually protect the company's marque stature.

Company X needs to link the quality principles with Contractors safety management as one of the strategic elements. Improved contactor management, safety excellence and care for employees incorporated in the five-step process value chain for suppliers can be achieved by adopting the following Quality principles as Evans (2011) discussed in his book;

- *Leadership:* monitoring and continually reviewing the OHS management and performance.
- *Stakeholder Engagement:* maintain high level of communication between Company X and contractor leadership, employees, government departments and other external stakeholders.
- *System Approach to Management:* effective management of interrelated processes of the five phases of the contractor's management value chain.

Role of Leadership

Leadership has remained a major area of interest in the implementation of QMS (Hussain & Younis, 2015); the effective implementation of the system lies with management. Quality management has been appraised as a basic element of the general authoritative execution from the time following the large-scale manufacturing (Hussain & Younis 2015). The management of the contractors needs to commit to the implantation of the QMS and understand the principles of meeting and exceeding customers' needs. Leadership is critical in the implementation of QMS.

Management of Company X need to consider conducting supplier audit to evaluate compliance. As indicated by Kitheka et al. (2013), the audits should be aimed at improving the relationship between the supplier and the client. To adequately execute the quality execution of the contractors Company X needs to actualize execution estimation, provider reviews, provider improvement and supplier integration as they are the most utilized provider quality administration rehearses (Kitheka et al, 2013).

Sharma et al. (2012) indicate that QMS need to be integrated from the procurements stage of the project to ensure that the contractor complies with quality requirements before the tender is awarded. The supply chain management is key for initiating quality management system to the contractors by integrating quality requirements in procurement processes.

An ineffectual Quality Management System may; bring about the cost of examining nonconforming goods and services to decide the underlying drivers, improving and additionally rejecting faulty items, acquire extra creation expenses to supplant them and quality impacts our organization's notoriety. A solid notoriety for quality can be a critical differentiator between a fruitful business and one that is definitely not (Piskar, 2007).

Continuous Quality Improvement

Entrenching a culture of Continuous Quality improvement by taking responsibility and leadership to create the required culture. As employees, regardless of our status or rank, each one of us has the moral responsibility to fulfil the handling of our assigned tasks, duties, and responsibilities with Quality in mind. It is always cheaper to do the job right the first time rather than correct problems later. By ensuring quality standards we strive to reduce defects to a minimum; zero defects (Fernandes et al., 2014).

Quality management value chain is a sequence of interrelated quality management capabilities and associated activates that support the enablement of product/services and the business system integrity. It provides the means through which quality management architecture and business context are seamlessly integrated. Quality planning is a proactive control process that involves the development, organization and management of quality management activities required to enable conformance to requirements.

Customer Satisfaction

QMS forces the organization to establish and enforce quality principles. It sets out the framework and standards that you are working to, and how you are going to meet them (Zhang et al, 2014), the system provides a clear road map for customer satisfaction. As per (Zhang et al 2014) QMS gives consistency and satisfaction to the extent procedures, materials equipment, and participations with all activities of the affiliation, beginning with the recognizing confirmation of customer necessities and culmination with satisfaction. The most important requirement for achieving customer satisfaction is to first understand the needs of the customers.

Organizational Culture

Quality culture is one of the most important aspects of an effective QMS within the organization, if a positive quality culture has been established and maintained within the organization the suppliers will easily adopt that culture embrace it. Durana et al. (2014) states that various tools such as quality control, project programs and QCP can be used to maintain positive quality culture.

RESEARCH METHODOLOGY

This section sets out the methodology for the data collection and the analyses of the collected data to assist in addressing the main research objective. The basis of methodology and data collection strategies is the information obtained from the literature reviewed in the previous section. It is important to state that the study was conducted at MPS, as indicated earlier. The study involved the contractors executing outage projects for Company X. Data

collected was not manipulated or altered in anyway. Full written consent was obtained from MPS' Risk and Assurance Manager to conduct the study.

Research Design, Population and Sampling

A mixed methods approach has been utilized as a part of this investigation. Mixed Method Research is an approach for analyzing information that incorporates assembling, dismembering, and fusing (or mixing) quantitative and subjective research (and data) in a singular report or a longitudinal program of demand (Johnson et al., 2018).

The combination of both qualitative and quantitative research methodology has been applied to further explore the findings from the literature review and the extent of application in practice. The quantitative research methodology will inquire about if and how the participants knows the project environment they are working on, and how that knowledge can be translated into numeric value. This will require the use of structured questionnaires. Qualitative research methodology will provide a depth of understanding on issues that are not possible using quantitative research, by using case studies.

The population of the study consists of the Project Managers, Quality Officers, Quality Controllers, Quality Inspectors, Site Managers, Quality Managers and Supervisors of Contractors as well as Company X's employees. The total population consist of 60 personnel and sample of 40 will be taken. A non-probability sampling of purposive is applied to select the sample of personnel.

Data Collection Procedures, Data Analysis and Interpretation

Structured questionnaires were used covering the following aspects – Quality of service, contractors, quality performance and Quality management system. The self-tailored questionnaire was based on information derived from the literature study and research questions. Questionnaires were sent to all personnel by email to be completed. A closed-end questionnaire consisting of five-point Linkert scale was adopted. The questionnaire consisted of four sections covering quality of service rendered, the impact of Company X's QMS on its contractors, compliance to Company X's QMS and improving quality performance of contractors. Descriptive statistics will be used to summarize the data collected, Samuels, which is a method for summarising data in the form of average, percentage and graph (Witmer and Schaffner, 2015)

Data collected from the interview is captured into QuestionPro system for analysis and the graphs are used to interpret the results from the system. The results are published using graphs and the interpretation of the results will be based on QuestionPro report. Field notes will be used to provide information about the implementation of QMS and the effectiveness of the system.

RESULTS AND DISCUSSIONS

All sections of the questionnaire, as depicted below in Table 1, were answered by all the participants, in other words, site managers, quality officers, supervisors, project managers and quality inspectors. The research findings were used to address the research questions. The table below indicated the number of respondents participated.

Table 1: Research Sample of respondents

Sample Frame	Number	Percentage
Site Managers	11	27,5%
Quality Officers	12	30%
Supervisors	6	15%
Project Managers	7	17,5%
Quality Inspectors	4	10%
TOTAL	40	100%

As depicted in Table 2, the first section of questionnaires which is related to quality of service rendered by contractors, and the second section which is related to the compliance to Company X's QMS by contractors, have their data evaluated based on a Likert type three-point scale with Yes, No or Maybe as available options to answer the questions. The third and fourth sections of the questionnaire, however, were evaluated using a different Likert scale type. The third section which relates to improving the performance of contractors and the fourth section of the questionnaire which relates to the impact of Company X's QMS on quality performance of its contractors were evaluated based on Likert type five-point scale in the following manner 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree and 1 = Strongly Disagree.

Table 2: Overall Matrix scorecard

Section 1 - Quality service rendered	**Count**	**Score**
1. Have your company experienced any re-works during outage?	40	1.175
2. Have your company been issued with Non-conformance report by Company X?	39	1.333
3. Is your company always adhering to the program schedule	39	1.538
4. Have your company implemented a quality management system	40	1.400
	Average	***1.362***
Section 2 - Compliance to Company X's QMS (Quality management system)	**Count**	**Score**
1. Have your company implemented a complaint QMS?	38	3.395
2. The internal audit findings are addressed and closed out?	39	1.564
3. Have your company appointed quality management representative?	40	1.550
4. Has your company developed work instructions and quality process?	40	1.575
	Average	***1.521***
Section 3 - Improving quality performance of contractors	**Count**	**Score**
1. My company implemented QMS	40	2.925
2. We understand the requirements of Company X's QMS	40	2.975
3. My company has established quality objectives and targets	37	2.757
4. We have entrenched quality management in all our activities	40	2.875
	Average	***2.883***
Section 4 - The Impact of Company X's QMS on contractors	**Count**	**Score**
1. Company X conducts audits regularly at my company	39	2.846
2. My company has always approved QCP before executing the project	40	2.550
3. My company has appointed Quality Control Officer	40	2.675
4. My company is aware that Company X has implemented QMS	40	2.175
	Average	*2.562*

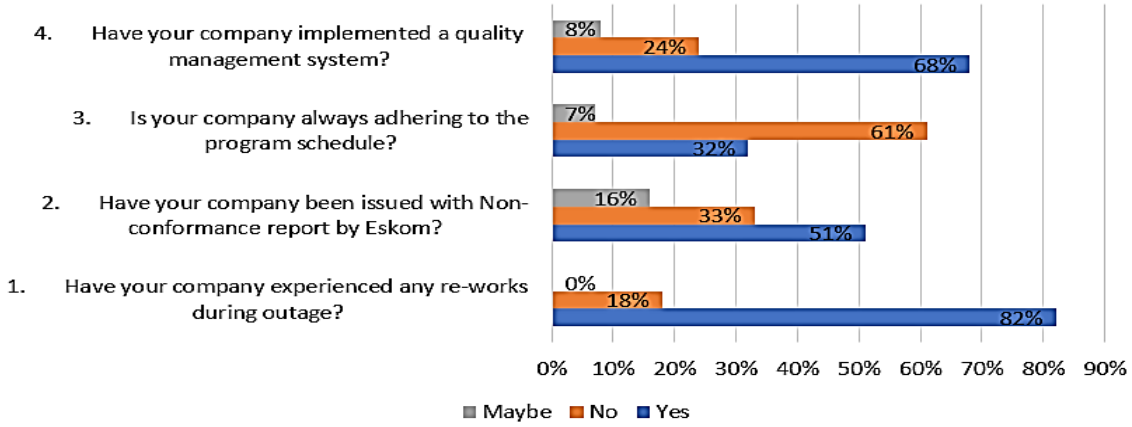
DISCUSSION

The purpose of this study is to assess the impact of X-MPS' QMS on the quality performance of contractors. This section resolves the four research questions namely: (1) How to improve quality of service rendered by contractors, (2) What is the impact of Company X quality management system on contractor's quality performance, (3) Do the contractors comply with the requirements of Company X's QMS and lastly, (4) How to improve the quality performance of the contractors. This is achieved by presenting, analyzing and interpreting the results of the survey. In total 60 questionnaires were distributed and 40 responses received, this presents a response rate of 66 per cent.

The first section was regarding the quality of services rendered by the contactors. The responded indicated that their companies always experience re-works during the execution of the project and most of their companies were issued with Non-Conformance Report (NCR). This is a clear indication that the quality services rendered by contactors is poor and needs to be improved. Most companies do not adhere to the program schedule, which leads to

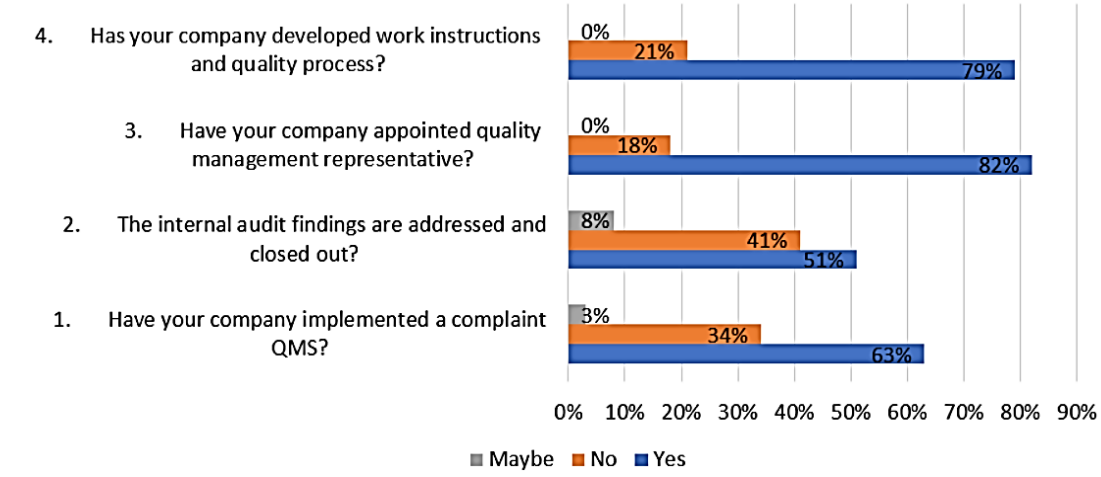
work not being completed on time. However, regarding the implementation of QMS 68% indicated that their companies have implemented the system.

Figure 1: Survey Results in Terms of Percentage Response, Section 1



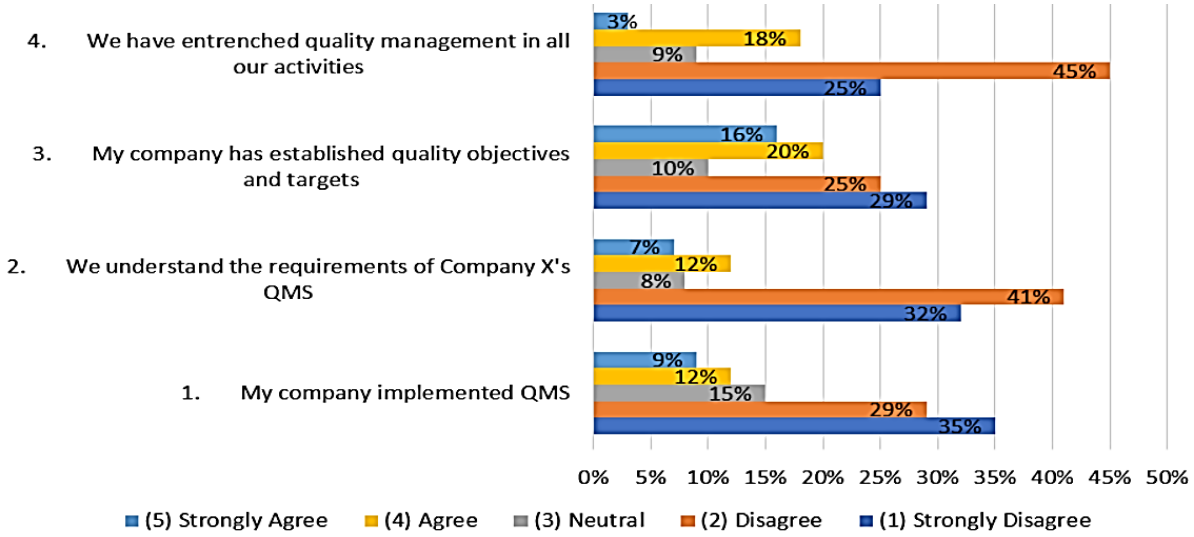
The second section is related to compliance with Company X's QMS requirements, and 63% of the contractors have implemented the QMS, while 51% of them address the internal audits findings. As per the respondents to the survey, 82% have appointed a quality management representative, and 79% of respondents have indicated that their companies have developed work instructions and quality process.

Figure 2: Survey Results in Terms of Percentage Response, Section 2



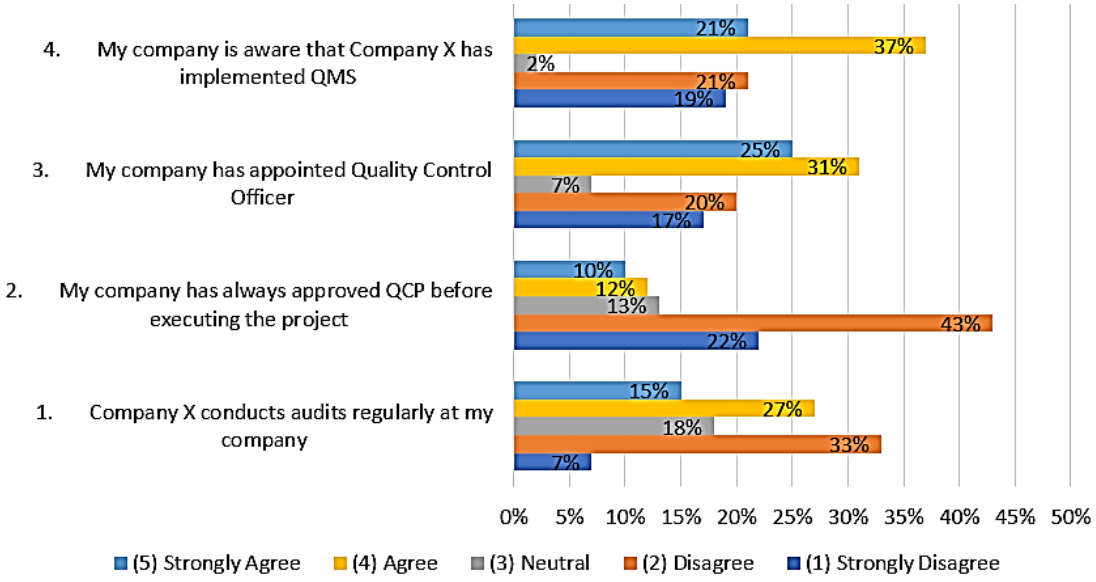
In the third section of the survey which is related to the improvement of quality performance of the contactors, 64% of respondents indicated that their companies implemented QMS, while 73% of respondents do not understand Company X's QMS. They are also not aware of Company X's QMS and are not comfortable with the level of integrating quality into the company process.

Figure 3: Survey Results in Terms of Percentage Response, Section 3



The fourth section of the survey is regarding the impact of Company X's QMS on the contractor's quality performance. It is evident that Company X does not conduct audits of its contractors regularly, however the implementation of QCP was effective. Most contractors have appointed Quality Officer to assist with the implementation of QMS requirements. Most companies were also aware that Company X has implemented a QMS.

Figure 4: Survey Results in Terms of Percentage Response, Section 4



CONCLUSION AND RECOMMENDATIONS

From the study it may be concluded that Company X's QMS is not used effectively to improve the quality performance of contactors executing outage projects. Majority of contactors are aware of the quality management system; however, compliance to QMS is not properly enforced by Company X to ensure that all contractors adhere

to the requirements. It was also noted that most contactors have implemented a QMS although the system is not certified; Quality resources were also employed by contractors to assist with quality issues during the project.

It is recommended that QMS requirements be incorporated within the tendering phase to ensure that contractors are aware of quality expectations and that the contactors appointed for the projects meet those requirements. Company X needs to conduct regular audit on its contractors' QMS to enforce compliance to the system; all contractors should be inducted on Company X's Quality requirements. An effective QMS for management of contractors should be established.

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